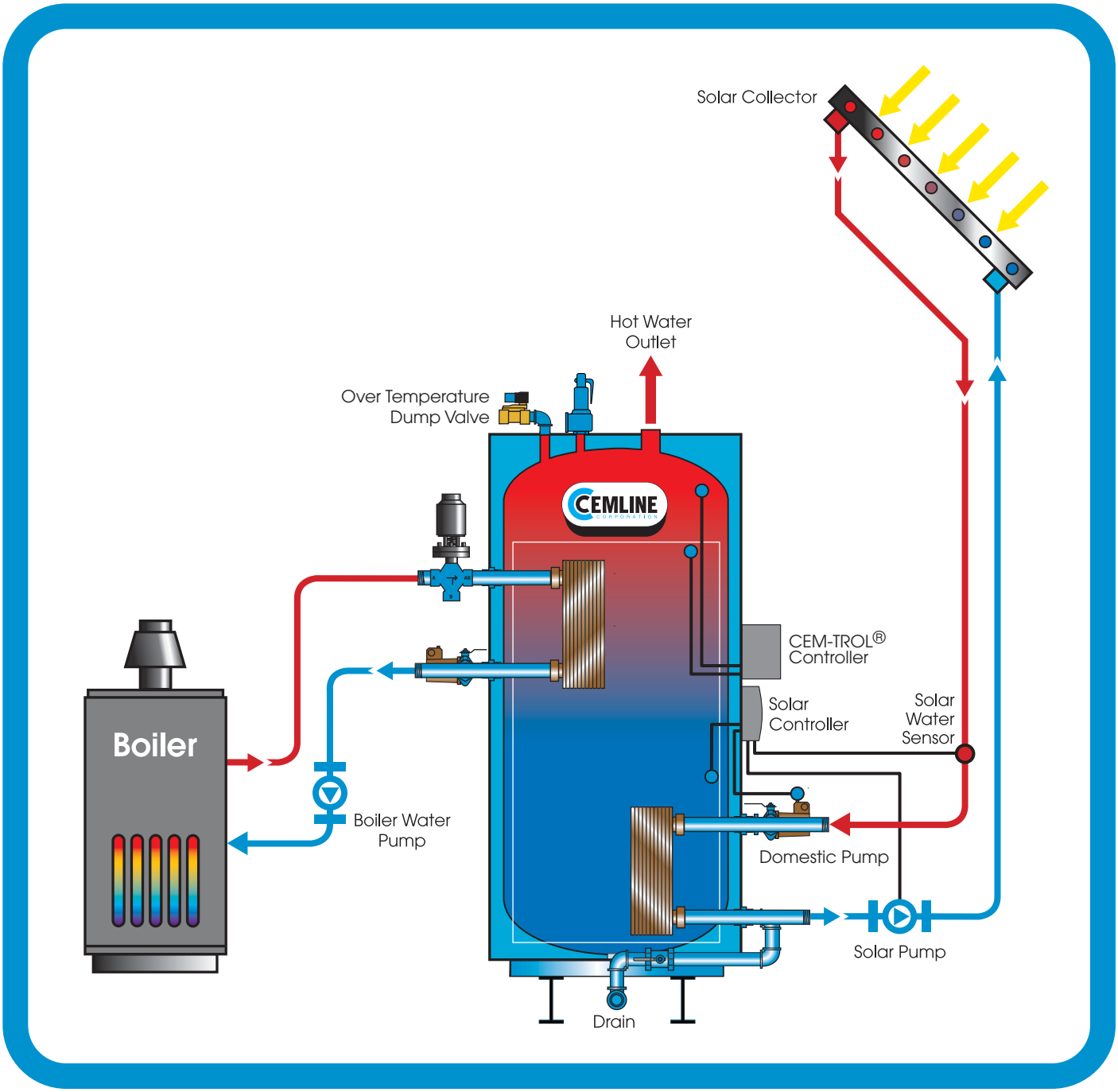
Water Heaters

Solar Applications



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Cemline® Solar Water Heaters
Single or Dual Energy Source Water Heaters
- **Solar, Solar/Boiler Water, Solar/Steam or Solar/Electric**

Cemline developed Storage Plate Heaters to work with condensing hydronic boilers. The plate heat exchanger allows the boiler water temperature drop to be as great as 100°F allowing the water heater to use less gallons per minute of boiler water than a traditional U-bend coil water heater. The Storage Plate Heater is a perfect fit for solar water applications because the plate heat exchanger offers high efficiencies, compact size, and close approach temperatures.

The Solar Water Heater can also be supplied as a dual energy source unit using either boiler water, steam, or electric as the back-up energy source for times when solar energy is not enough or unavailable. Boiler water applications use a brazed plate heat exchanger or a U-Bend submerged coil. Steam applications use a U-Bend submerged coil, and electric applications use incoloy immersion electric elements (208, 220, or 480 VAC).

The Solar Water Heater control system controls both the solar water and the boiler water. On the solar water side the control turns on/off a solar water pump based upon a differential between the tank temperature and the solar water temperature. On the boiler water/steam side the control system modulates a electronic control valve to allow boiler water/steam to enter the heat exchanger and heat the tank. On an electric unit the control opens/closes contactors to turn on/off elements to maintain proper temperature control.

Basic Package Includes:

A.S.M.E. CODE Constructed National Board Registered storage tank

STONESTEEL® lining

316-L Stainless Steel threaded connections

3" Fiberglass insulation

20 gauge steel jacket with hammertone enamel paint

Structural steel base

A.S.M.E. relief valve-pressure and temperature

Electronic temperature gauge

Water pressure gauge

Drain valve

Solar Water Brazed Plate Heat Exchanger

Secondary Energy Supply (if required)
- Boiler Water: Brazed Plate or U-Bend Heat Exchanger
- Steam: U-Bend Heat Exchanger
- Electric: Electric Immersion Elements

Integral bronze circulator(s)

Single safety system with electronic limit control

Electronic Control Valve
- Boiler Water: 2 or 3-way
- Steam: 2-way

Boiler water temperature gauge or steam pressure gauge

CEM-TROL® control module

Solar control - Relay to turn on solar pump.

Over temperature dump valve

Solar collectors and solar pumps supplied and installed by others in the field.

Optional:

316-L stainless steel vessel

Double walled heat exchanger

Boiler water pump

Solar water pump

Aquastat for boiler water pump

BTU indicator

Solar water electronic control valve

U-Bend solar water heat exchanger

Openings for external water heater

Cemline® Solar Water Heaters
Operation Sequence
- **Solar, Solar/Boiler Water**

Solar Only

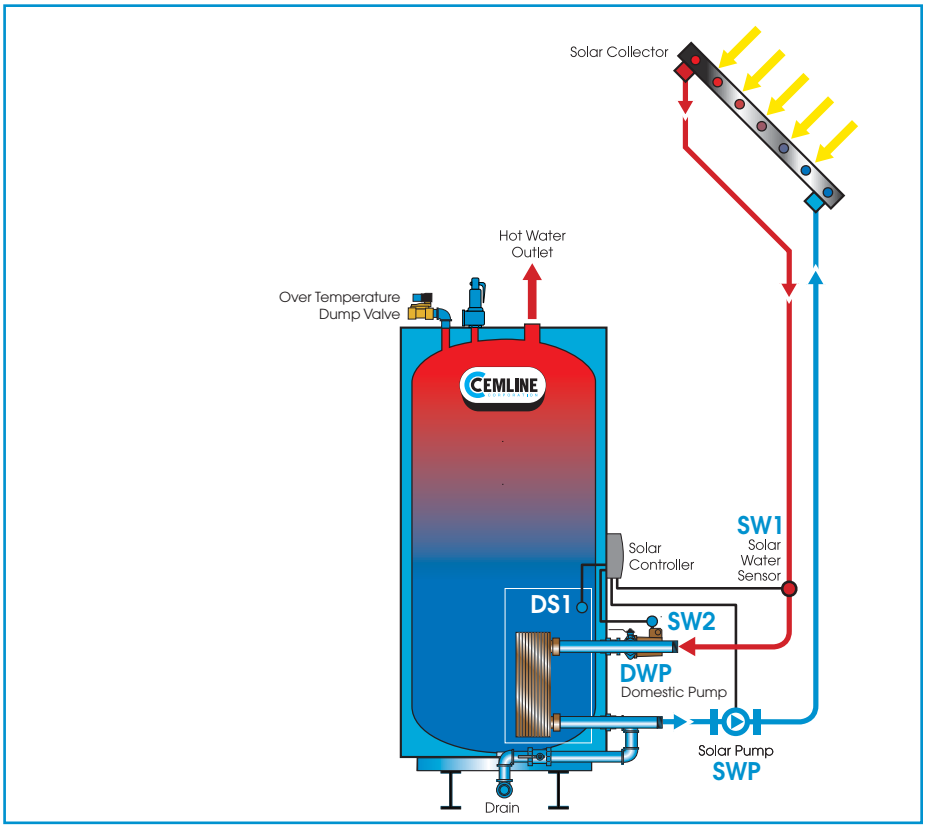
SW1 — Solar water sensor from solar panel
DS1 — Domestic tank water sensor
SW2 — Solar water sensor to solar panels
SWP — Solar water pump
DWP — Domestic water pump

SWP + DWP turns ON if the temperature difference (Delta T) between SW1-DS1 is 15° F or greater.

SWP + DWP turns OFF if the Delta T decreases to 5° F or lower.

Dump valve will open when the tank temperature reaches 170° F allowing cold water to enter tank and reduce solar panel temperature. Dump valve will close when tank temperature falls below 165° F.

The Solar Heater can also be used to recover energy from condensate systems. In this application, the solar water pump would be replaced by a condensate pump with receiver (CP). When the CP receiver fills, the CP and the DWP turn ON and when the receiver empties the CP and DWP are turned OFF. This is can be used to recover energy before dumping the condensate to drain or sending condensate back to the boiler feed system to make pre-heat hot water or used in combination with boiler water, steam, or electric energy sources in one vessel.



Solar / Boiler Water

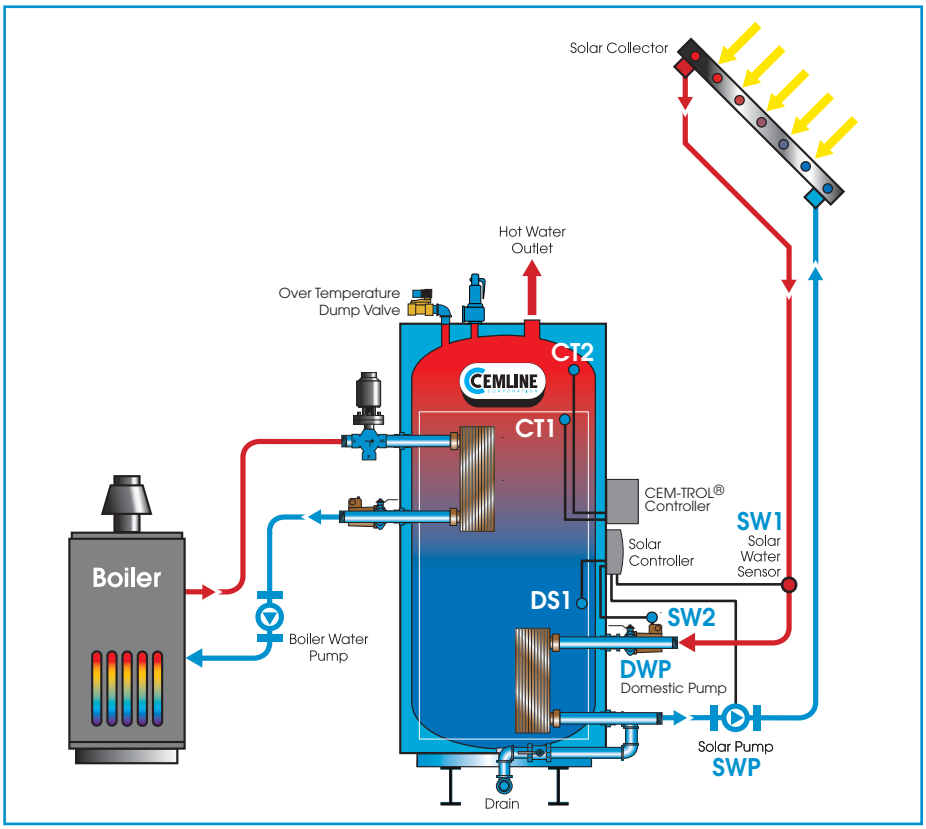
SW1 — Solar water sensor from solar panel
DS1 — Domestic tank water sensor
SW2 — Solar water sensor to solar panels
SWP — Solar water pump
DWP — Domestic water pump
CT1 — CEM-TROL® Sensor 1 operating temperature
CT2 — CEM-TROL® Sensor 2 high limit temperature

SWP + DWP turns ON if the temperature difference (Delta T) between SW1-DS1 is 15° F or greater.

SWP + DWP turns OFF if the Delta T decreases to 5° F or lower.

Dump valve will open when the tank temperature reaches 170° F allowing cold water to enter tank and reduce solar panel temperature. Dump valve will close when tank temperature falls below 165° F.

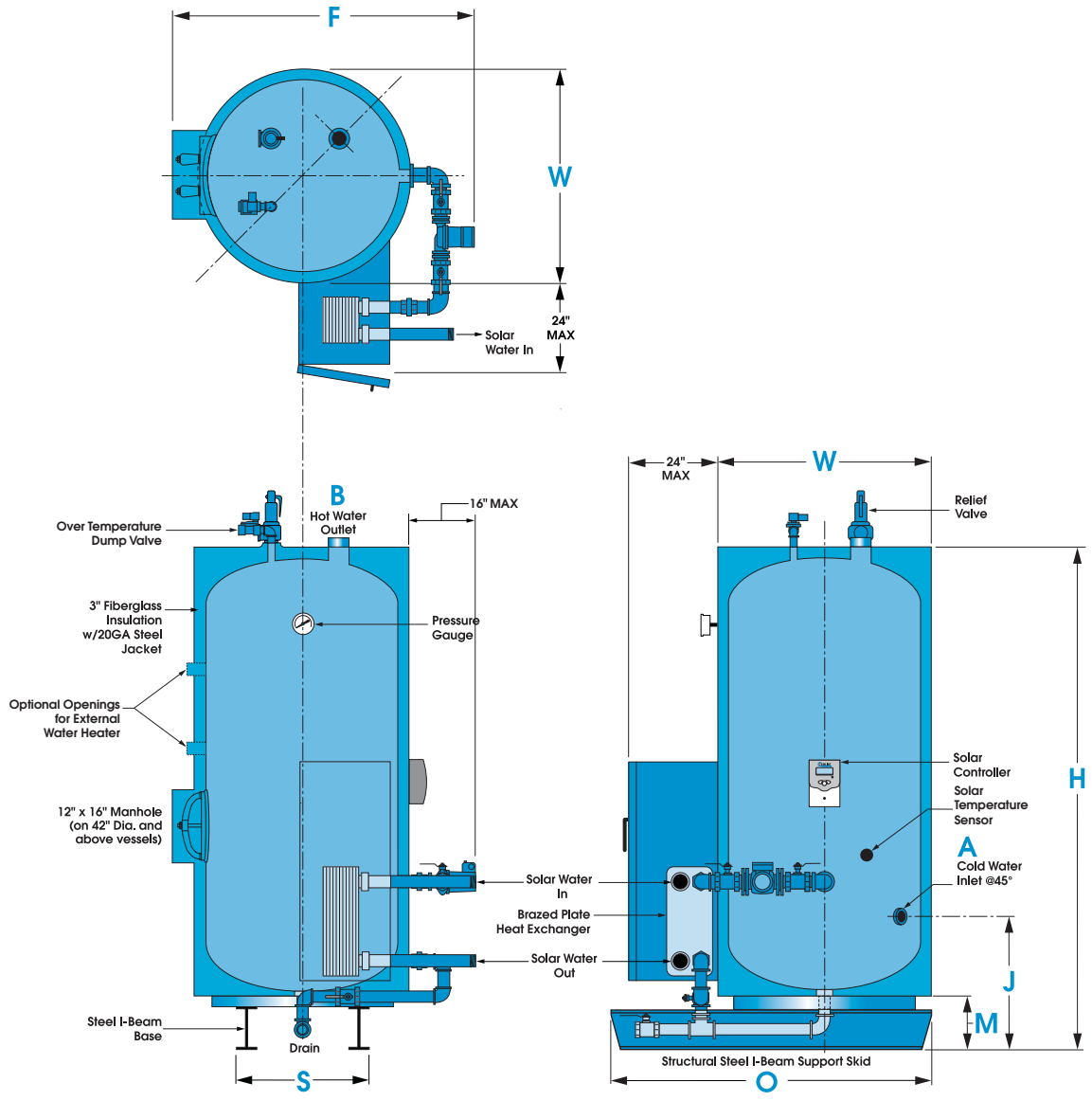
The CEM-TROL® controller will be set to maintain a set point on the top 1/3 of the tank, typically between 120-140° F, for times when solar heater is offline or unable to keep up with the demand. CEM-TROL® modulates control valve open/closed allowing boiler water/steam to enter heat exchanger maintaining desired setpoint.



Solar Water-Brazed Plate Water Heaters
Dimensional Data—SLR-P

Cemline Solar Water Heaters can be supplied with either single or double wall brazed plate heat exchangers. These vertical packaged heaters are normally piped as shown below.

Brazed Plate Unit



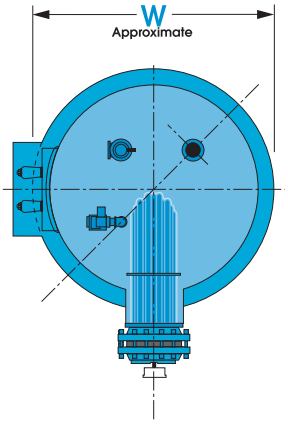
GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	F	M	S	A & B*
120	V120SLR-P	24" x 63"	28"	77"	48"	24"	52"	10"	20"	1 1/2"
200	V200SLR-P	30" x 76"	34"	90"	54"	28"	58"	10"	24"	1 1/2"
300	V300SLR-P	36" x 80"	40"	94"	60"	28"	64"	10"	25"	1 1/2"
500	V500SLR-P	42" x 90"	46"	104"	66"	30"	70"	10"	32"	1 1/2"
680	V680SLR-P	48" X 96"	52"	110"	72"	30"	76"	12"	42"	2"
1000	V1000SLR-P	60" X 96"	64"	110"	84"	40"	88"	12"	46"	2"

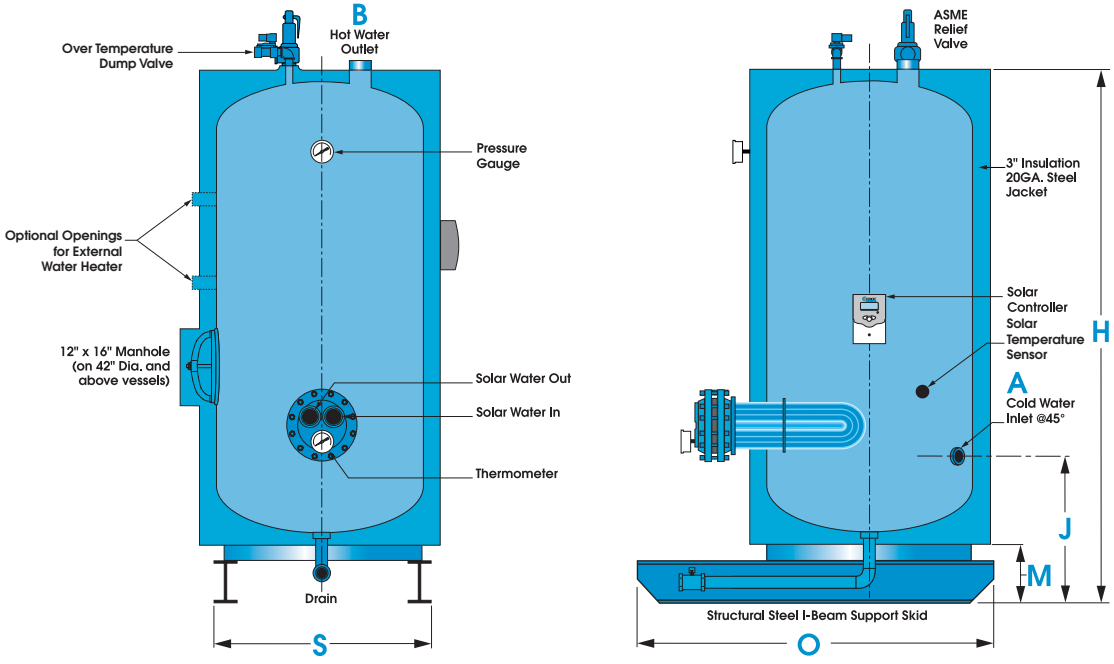
*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

Solar Water-Submerged Coil Water Heaters Dimensional Data—SLR-C

Cemline Solar Water Submerged Coil Water Heaters can be supplied with either single wall or double wall heat exchangers. These vertical packaged heaters are normally piped as shown below.

Coil Unit





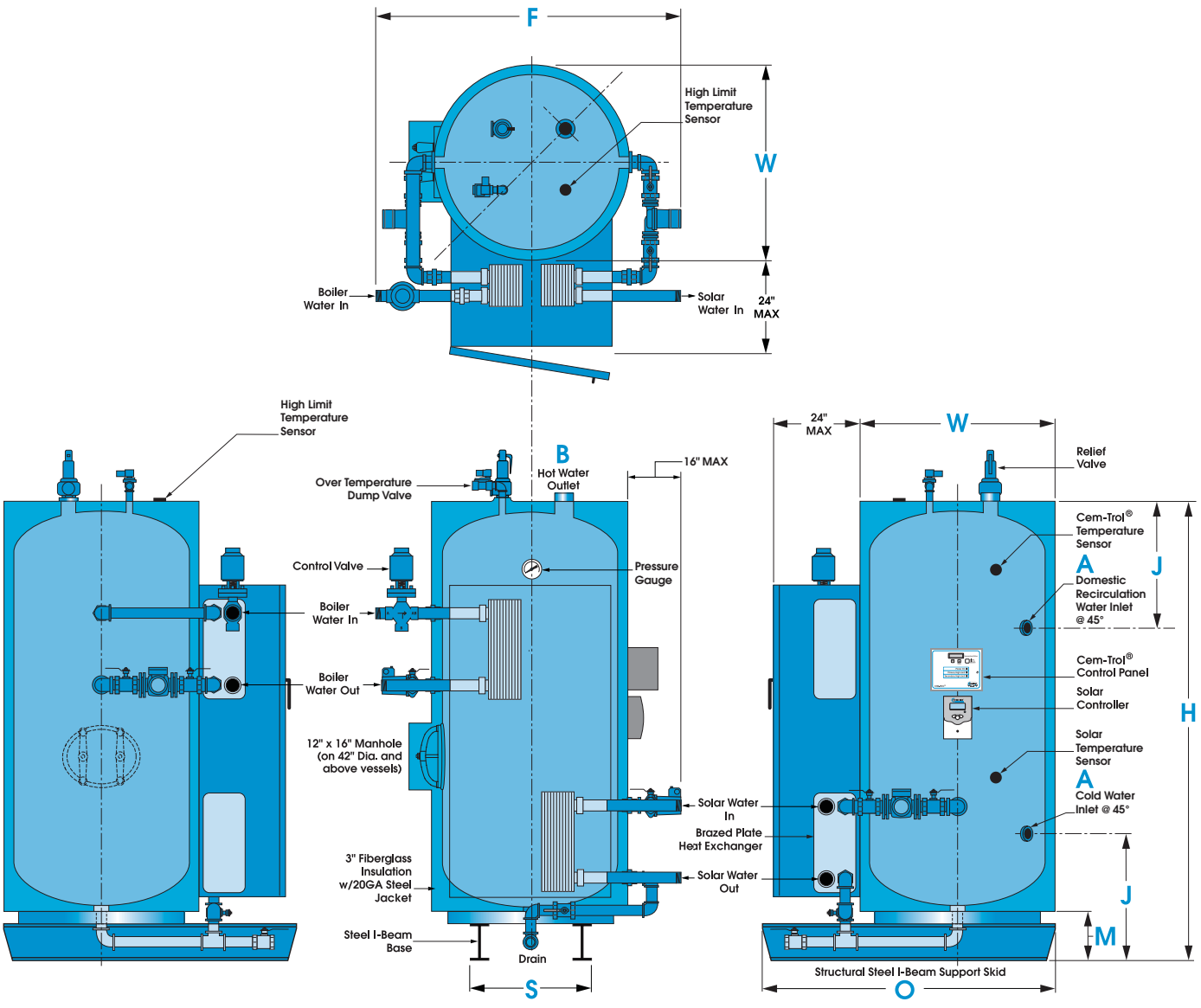
GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	M	S	A & B*
120	V120SLR-C	24" x 63"	28"	77"	48"	24"	10"	20"	1 1/2"
200	V200SLR-C	30" x 76"	34"	90"	54"	28"	10"	24"	1 1/2"
300	V300SLR-C	36" x 80"	40"	94"	60"	28"	10"	25"	1 1/2"
500	V500SLR-C	42" x 90"	46"	104"	66"	30"	10"	32"	1 1/2"
680	V680SLR-C	48" X 96"	52"	110"	72"	30"	12"	42"	2"
1000	V1000SLR-C	60" X 96"	64"	110"	84"	40"	12"	46"	2"

*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

Solar/Boiler Water-Dual Brazed Plate Water Heaters Dimensional Data—SPH-SLR-P

Cemline Solar/Boiler Water Heaters can be supplied with either single or double wall brazed plate heat exchangers. These vertical packaged heaters are normally piped as shown below. Also available with 3-way control valve.

Dual Brazed Plate Unit



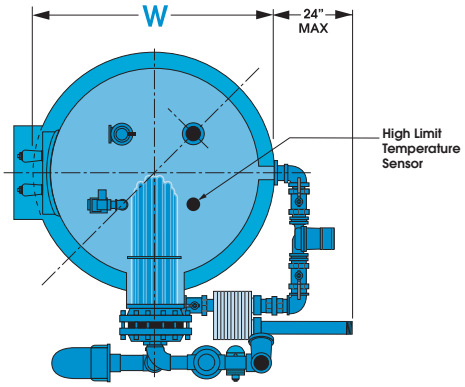
GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	F	M	S	A & B*
120	V120SPH-P	24" x 63"	28"	77"	48"	24"	52"	10"	20"	1 1/2"
200	V200SPH-P	30" x 76"	34"	90"	54"	28"	58"	10"	24"	1 1/2"
300	V300SPH-P	36" x 80"	40"	94"	60"	28"	64"	10"	25"	1 1/2"
500	V500SPH-P	42" x 90"	46"	104"	66"	30"	70"	10"	32"	1 1/2"
680	V680SPH-P	48" X 96"	52"	110"	72"	30"	76"	12"	42"	2"
1000	V1000SPH-P	60" X 96"	64"	110"	84"	40"	88"	12"	46"	2"

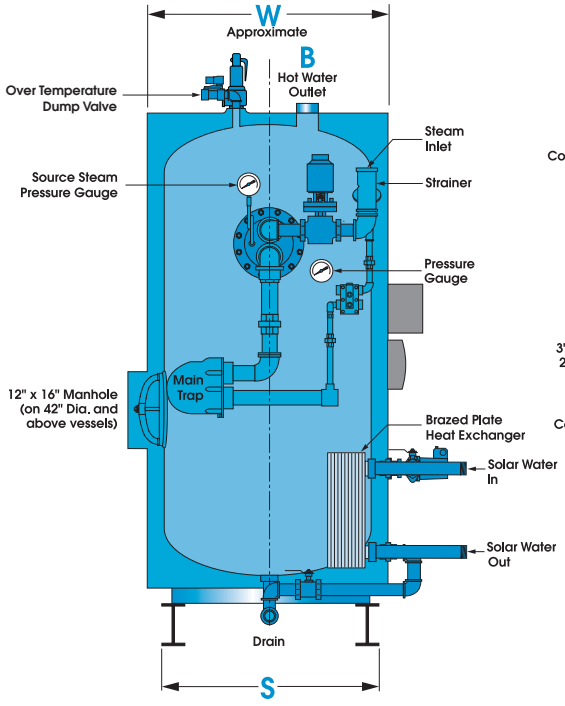
*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

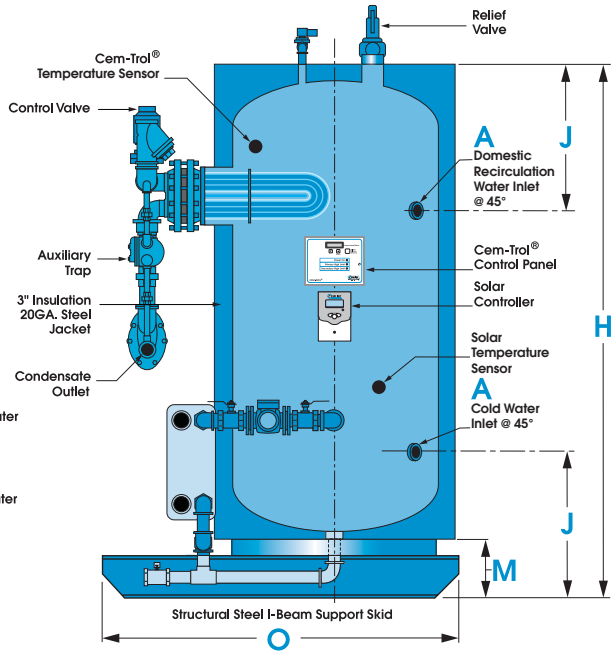
Solar Brazed Plate-Steam Coil Water Heaters Dimensional Data—SWH-SLR-P

Cemline Solar Brazed Plate Steam Coil Heaters can be supplied with either single wall or double wall heat exchangers. These vertical packaged heaters are normally piped as shown below.

Brazed Plate with Coil Unit







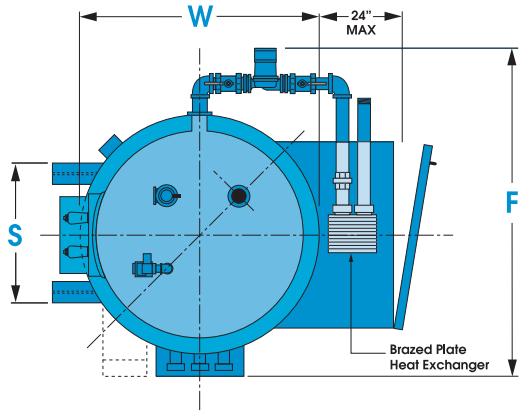
GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	M	S	A & B*
120	V120SLR-P	24" x 63"	28"	77"	48"	24"	10"	20"	1 1/2"
200	V200SLR-P	30" x 76"	34"	90"	54"	28"	10"	24"	1 1/2"
300	V300SLR-P	36" x 80"	40"	94"	60"	28"	10"	25"	1 1/2"
500	V500SLR-P	42" x 90"	46"	104"	66"	30"	10"	32"	1 1/2"
680	V680SLR-P	48" X 96"	52"	110"	72"	30"	12"	42"	2"
1000	V1000SLR-P	60" X 96"	64"	110"	84"	40"	12"	46"	2"

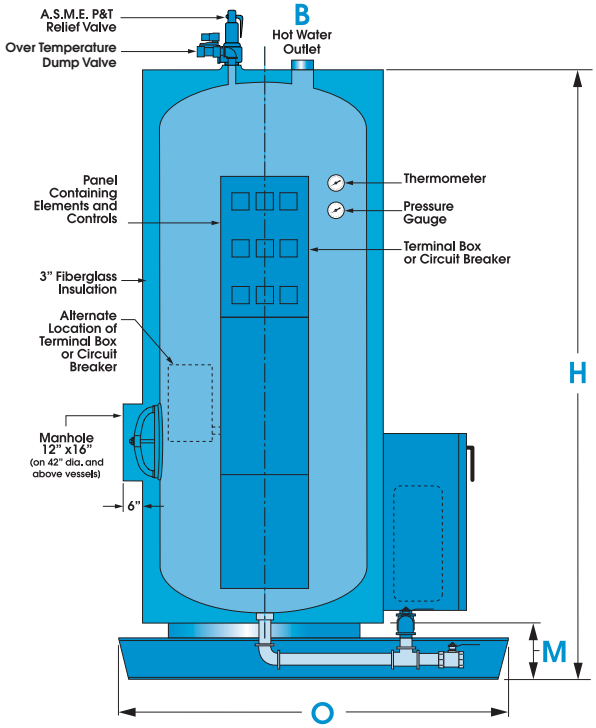
*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

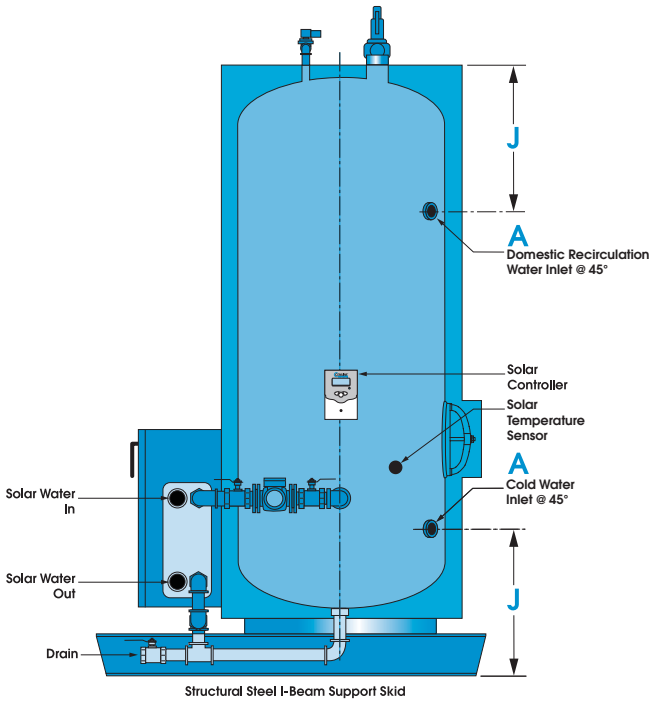
Solar Brazed Plate-Electric Water Heaters
Dimensional Data—EHB-SLR-P

Cemline Solar Brazed Plate-Electric Water Heaters can be supplied with either single wall or double wall heat exchangers. These vertical packaged heaters are normally piped as shown below.

Brazed Plate with Electric Unit







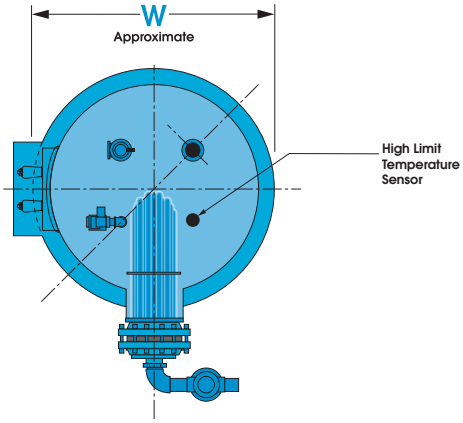
GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	F	M	S	A & B*
120	V120EHB-SLR-P	24" x 63"	28"	77"	48"	24"	52"	10"	20"	1 1/2"
200	V200EHB-SLR-P	30" x 76"	34"	90"	54"	28"	58"	10"	24"	1 1/2"
300	V300EHB-SLR-P	36" x 80"	40"	94"	60"	28"	64"	10"	25"	1 1/2"
500	V500EHB-SLR-P	42" x 90"	46"	104"	66"	30"	70"	10"	32"	1 1/2"
680	V680EHB-SLR-P	48" x 96"	52"	110"	72"	30"	76"	12"	42"	2"
1000	V1000EHB-SLR-P	60" x 96"	64"	110"	84"	40"	88"	12"	46"	2"

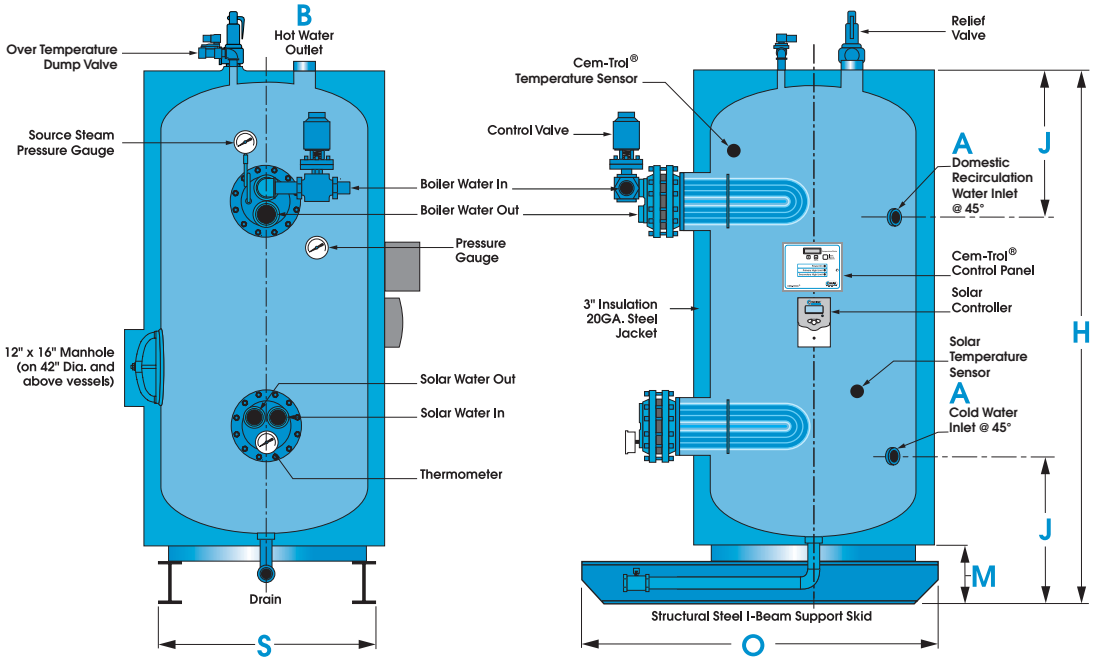
*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

Solar/Boiler Water-Dual Coil Water Heaters
Dimensional Data—SWH-SLR-C

Cemline Solar/Boiler Water Dual Coil Water Heaters can be supplied with either single wall or double wall heat exchangers. These vertical packaged heaters are normally piped as shown below. Also available with 3-way control valve.

Dual Coil Unit





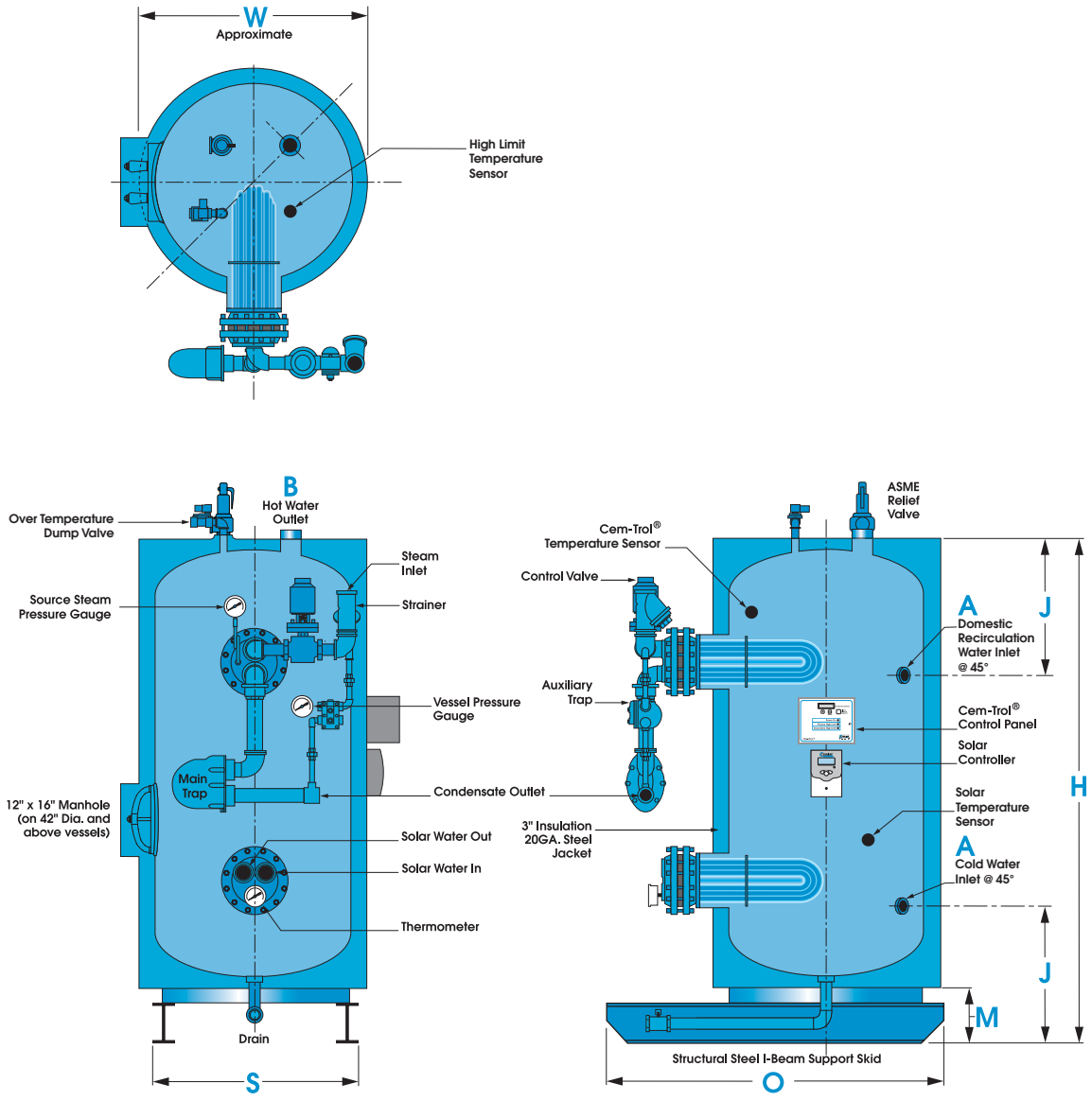
GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	M	S	A & B*
120	V120SWH-SLR-C	24" x 63"	28"	77"	48"	24"	10"	20"	1 1/2"
200	V200SWH-SLR-C	30" x 76"	34"	90"	54"	28"	10"	24"	1 1/2"
300	V300SWH-SLR-C	36" x 80"	40"	94"	60"	28"	10"	25"	1 1/2"
500	V500SWH-SLR-C	42" x 90"	46"	104"	66"	30"	10"	32"	1 1/2"
680	V680SWH-SLR-C	48" X 96"	52"	110"	72"	30"	12"	42"	2"
1000	V1000SWH-SLR-C	60" X 96"	64"	110"	84"	40"	12"	46"	2"

*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

Solar/Steam-Dual Coil Water Heaters
Dimensional Data—SWH-SLR-C

Cemline Solar Coil Steam Coil Water Heaters can be supplied with either single wall or double wall heat exchangers. These vertical packaged heaters are normally piped as shown below.

Dual Coil Unit



GALLON CAPACITY	MODEL NUMBER	TANK SIZE D x L	W	H	O	J	M	S	A & B*
120	V120SWH-SLR-C	24" x 63"	28"	77"	48"	24"	10"	20"	1 1/2"
200	V200SWH-SLR-C	30" x 76"	34"	90"	54"	28"	10"	24"	1 1/2"
300	V300SWH-SLR-C	36" x 80"	40"	94"	60"	28"	10"	25"	1 1/2"
500	V500SWH-SLR-C	42" x 90"	46"	104"	66"	30"	10"	32"	1 1/2"
680	V680SWH-SLR-C	48" X 96"	52"	110"	72"	30"	12"	42"	2"
1000	V1000SWH-SLR-C	60" X 96"	64"	110"	84"	40"	12"	46"	2"

*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.

Solar Water Heaters-
Sample Specifications

For specifying CEMLINE Solar Water Heaters, select model from charts and use specification below. Please contact Cemline or your local representative for sizing or go to www.cemline.com to access on-line.

Solar Water Heaters

Solar water heater shall be Cemline Series SLR; factory assembled and packaged. Water heater shall be constructed in accordance with ASME Code for a working pressure of 125 psig. The packaged water heater shall be constructed with a vertical steel tank, cement lined (or 316-L stainless steel) with 316-L stainless threaded openings.

Heater shall be mounted on a steel support skid and shall have concealed lifting lugs. Heater shall be insulated with 3" Fiberglass protected by an enameled metal jacket, 20 gauge minimum thickness. Solar water heat exchanger shall be a double walled brazed plate (or double walled u-bend coil). Optional secondary energy source shall be boiler water or steam or electric.

Boiler water heater shall be factory assembled and piped including electronic operated 2 or 3-way temperature regulating valve. Heat exchanger shall be single wall copper brazed 316L Stainless Steel Plate Type (or double wall brazed, or double wall u-bend heat exchanger) and shall have an integral valved circulator to circulate domestic water through the heat exchanger into the bottom of the tank.

Steam heater shall be factory assembled and piped including incoming steam strainer, electronic temperature regulator, main and auxiliary float and thermostatic steam traps, and condensate strainer. Coil shall have copper wrapper, shall be baffled and shall have an integral valved circulator to circulate the water across the coil into the bottom of the tank.

Electric heater elements shall be individually flange mounted. Total KW shall be _____ . Elements shall be designed to operate on _____ volts, _____ phase, _____ cycle.

Elements shall be controlled by immersion thermostats and electrically held contactors. Elements and thermostats shall be arranged to bring load on in _____ steps. All element circuits shall be fused with Class J fuses.

Control circuit shall operate on 120 volts supplied by an integral trans former for the control circuit. Both high voltage and low voltage side of transformer shall be fused and the low voltage side grounded to the heater and jacket in accordance with A.S.M.E. Code.

Control circuit shall include one manual reset and one automatic reset high temperature thermostats with bulb located near top of tank and one electronic low water cut-off.

Elements, thermostats, contactors, transformers, low water cut-off, and high limit thermostats shall be factory wired to terminal strip.

Heater shall be provided with a field programmable digital electronic limit control with LCD readout and digital thermometer.

Heater shall be furnished with a water pressure gauge and an A.S.M.E. pressure-temperature relief valve of sufficient size to relieve total BTU input of the coil.

Manufacturer shall assume responsibility for correct sizing of components to assure performance designated in design criteria.

Heater shall be Cemline Corporation Model V_____SLR_____.
Tank dimensions _____" diameter x _____" long.
Storage gallon capacity _____ .
Solar heat exchanger to heat _____ GPH from ____ °F to ____ °F with _____ GPM of _____ °F inlet - _____ °F outlet propylene glycol.

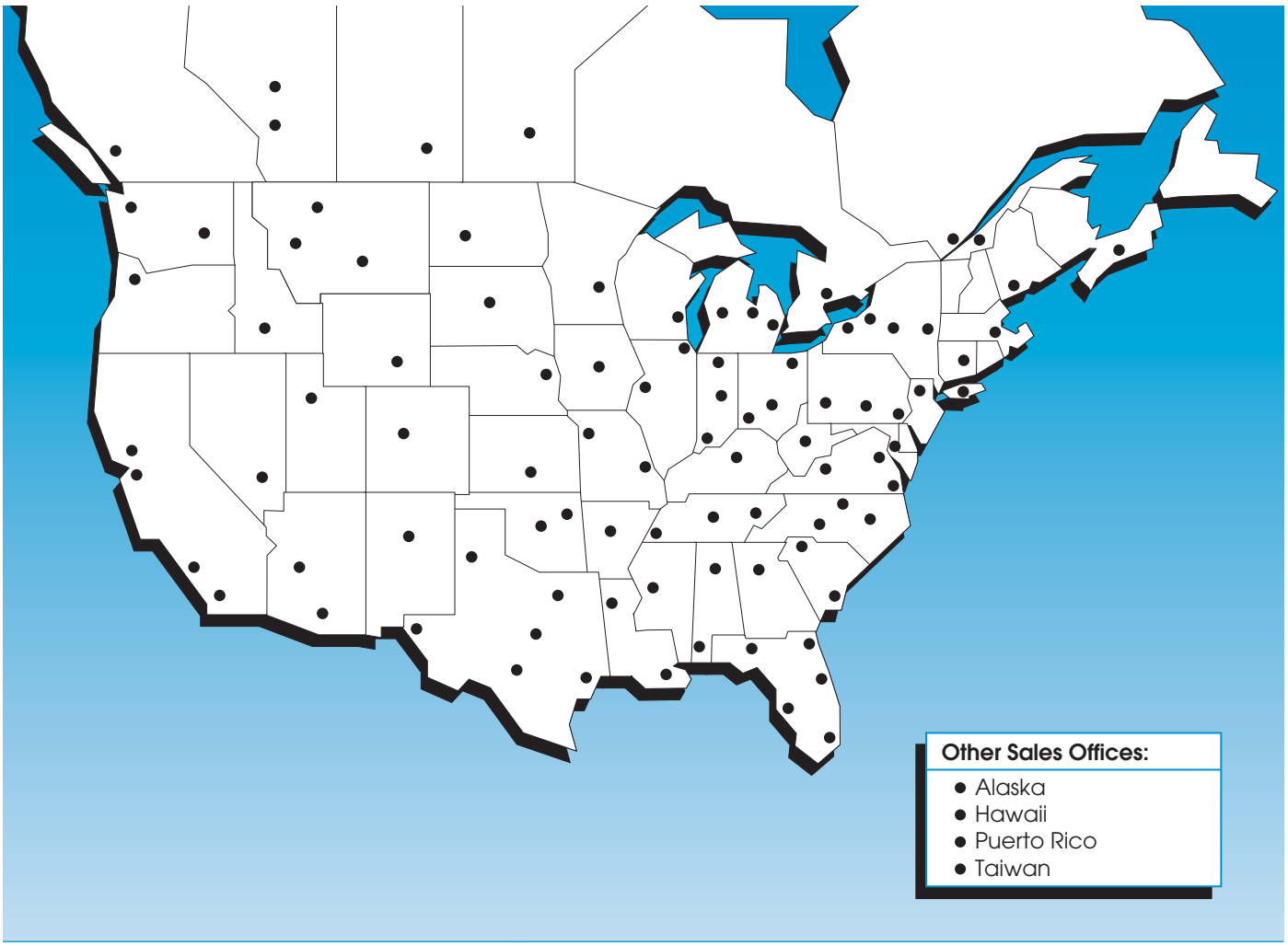
OPTIONAL:

Boiler water heat exchanger to heat _____ GPH from ____°F to ____°F with _____ GPM of ____ °F inlet- ____ °F outlet

Steam heat exchanger to heat _____ GPH from ____°F to ____°F with _____ PSIG steam to the control valve

Electric heater shall be _____ KW. Elements designed to operate on _____ volts, _____ phase, _____cycle.

Sales Offices



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